



AMD Opteron™ Processor Power and Thermal Data Sheet



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Table of Contents

1	AMD Opteron™ Processor	7
1.1	Ordering Part Number Description	7
1.2	AMD Opteron™ Processor Thermal/Power Specifications	25
2	MTOPS	41

List of Figures

Figure 1. AMD Opteron™ Processor Ordering Part Number Example 7

List of Tables

Table 1: Revision History	6
Table 2: AMD Opteron™ Processor Part Definition Options	7
Table 3: AMD Opteron™ Processor L2 Cache Size Options	8
Table 4: AMD Opteron™ Processor Temperature Options	8
Table 5: AMD Opteron™ Processor Operating Voltage	9
Table 6: AMD Opteron™ Processor Package Options	9
Table 7: AMD Opteron™ Processor Model Number Options	9
Table 8: AMD Opteron™ Processor Power Limit	10
Table 9: AMD Opteron™ Processor Thermal Profile	10
Table 10: AMD Opteron™ Processor BIOS Specifications - Rev CG	12
Table 11: AMD Opteron™ Processor BIOS Specifications - Rev E Single Core	14
Table 12: AMD Opteron™ Processor Thermal/Power Specifications - Rev B3	25
Table 13: AMD Opteron™ Processor Thermal/Power Specifications - Rev C0	26
Table 14: AMD Opteron™ Processor Thermal/Power Specifications - Rev CG	27
Table 15: AMD Opteron™ Processor Thermal/Power Specifications - Rev E Single-Core	30
Table 16: AMD Opteron™ Processor Thermal/Power Specifications - Rev E Dual-Core	35
Table 17: Composite Theoretical Performance (CTP) Calculations	41

Table 1: Revision History

Date	Revision	Description
November 2005	3.09	Added Rev. E single-core and dual-core OPNs. Added MTOPS chapter.
May 2004	3.05	Added Rev CG OPNs for models X40, X42, X44, X46, X48, and X50. Corrected note for S3 state.
March 2004	3.03	Added 55W and 30W OPNs for models X46 and X40.
November 2003	3.00	Initial public release.

1 AMD Opteron™ Processor

The following sections contain thermal/power and related BIOS specifications for AMD Opteron™ processors. Each column in the BIOS and thermal/power tables represents a specific Ordering Part Number (OPN). Section 1.1 provides an example of the OPN structure for this processor family. Availability of processors corresponding to certain OPNs is limited.

Refer to the *AMD Opteron™ Product Data Sheet*, order #23932 for all other electrical specifications for the processor. Refer to the *BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors*, order #26094 for power management BIOS requirements.

1.1 Ordering Part Number Description

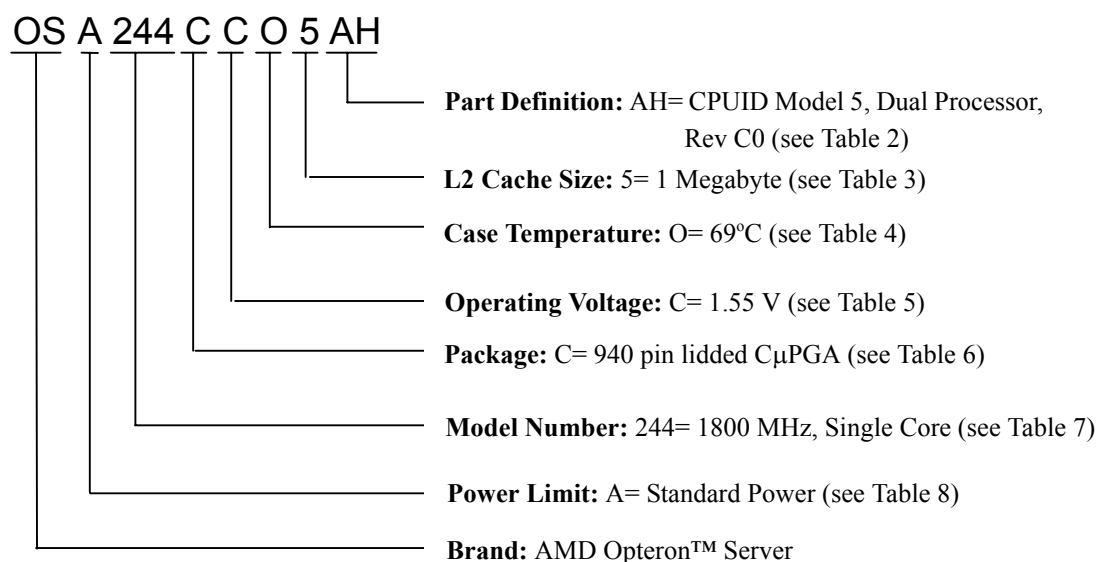


Figure 1. AMD Opteron™ Processor Ordering Part Number Example

Table 2: AMD Opteron™ Processor Part Definition Options

Part Definition	Link Coherency	Revision	Package Drawing
AH	2P	Rev B3	Ceramic
AL	2P	Rev C0	Ceramic
AU	2P	Rev CG	Ceramic
BC	2P	Rev D0	Organic
BL	2P	Rev E4	Organic
CB	2P	Rev E6	Organic
AG	1P	Rev B3	Ceramic

Table 2: AMD Opteron™ Processor Part Definition Options

Part Definition	Link Coherency	Revision	Package Drawing
AK	1P	Rev C0	Ceramic
AT	1P	Rev CG	Ceramic
BB	1P	Rev D0	Organic
BK	1P	Rev E4	Organic
BN	1P	Rev E4	Organic
CA	1P	Rev E6	Organic
CD	1P	Rev E6	D1
AI	8P	Rev B3	Ceramic
AM	8P	Rev C0	Ceramic
AV	8P	Rev CG	Ceramic
BD	8P	Rev D0	Organic
BS	8P	Rev E1	Organic
BM	8P	Rev E4	Organic
CC	8P	Rev E6	Organic

Table 3: AMD Opteron™ Processor L2 Cache Size Options

OPN Character	Cache Size
6	2 MB
5	1 MB

Table 4: AMD Opteron™ Processor Temperature Options

OPN Character	Temperature
A	Variable
K	65°C
M	67°C
O	69°C
P	70°C
Q	71°C
T	78°C
U	83°C

Table 5: AMD Opteron™ Processor Operating Voltage

OPN Character	Operating Voltage
A	Variable
C	1.55 V
E	1.50 V
I	1.40 V
K	1.35 V
M	1.30 V
O	1.25 V
Q	1.20 V
S	1.15 V

Table 6: AMD Opteron™ Processor Package Options

OPN Character	Package
C	940 Pin Lidded CμPGA
F	940 Pin Lidded OμPGA
D	939 Pin Lidded OμPGA

Table 7: AMD Opteron™ Processor Model Number Options

Uni-Processor, Single-Core	Dual-Processor, Single-Core	Multi-Processor, Single-Core
140: 1400 MHz	240: 1400 MHz	840: 1400 MHz
142: 1600 MHz	242: 1600 MHz	842: 1600 MHz
144: 1800 MHz	244: 1800 MHz	844: 1800 MHz
146: 2000 MHz	246: 2000 MHz	846: 2000 MHz
148: 2200 MHz	248: 2200 MHz	848: 2200 MHz
150: 2400 MHz	250: 2400 MHz	850: 2400 MHz
152: 2600 MHz	—	—
154: 2800 MHz	254: 2800 MHz	854: 2800 MHz
—	260: 1600 MHz	860: 1600 MHz
165: 1800 MHz	265: 1800 MHz	865: 1800 MHz
170: 2000 MHz	270: 2000 MHz	870: 2000 MHz
175: 2200 MHz	—	875: 2200 MHz
180: 2400 MHz	280: 2400 MHz	880: 2400 MHz

Table 8: AMD Opteron™ Processor Power Limit

OPN Character	Power Limit
A	Standard Power
K	55 W
B	30 W

Table 9: AMD Opteron™ Processor Thermal Profile

Thermal Profile	A	B	C
Thermal Resistance (case to ambient)	0.34°C/W	0.27°C/W	0.53°C/W
Local Ambient Temperature	42°C	42°C	42°C
Tcase Max	Power (Thermal Profile A)	Power (Thermal Profile B)	Power (Thermal Profile C)
49°C	20.6 W	25.9 W	13.2 W
51°C	26.5 W	33.3 W	17.0 W
53°C	32.4 W	40.7 W	20.8 W
55°C	38.2 W	48.1 W	24.5 W
57°C	44.1 W	55.6 W	28.3 W
59°C	50.0 W	63.0 W	32.1 W
61°C	55.9 W	70.4 W	35.8 W
63°C	61.8 W	77.8 W	39.6 W
65°C	67.6 W	85.2 W	43.4 W
67°C	73.5 W	92.6 W	47.2 W
69°C	79.4 W	N/A	50.9 W
71°C	85.3 W	N/A	54.7 W

Thermal Profile	D	E	F
Thermal Resistance (case to ambient)	0.34°C/W	0.95°C/W	0.25°C/W
Local Ambient Temperature	42°C	42°C	42°C
Tcase Max	Power (Thermal Profile D)	Power (Thermal Profile E)	Power (Thermal Profile F)
49°C	20.6 W	7.4 W	28.0 W
51°C	26.5 W	9.5 W	36.0 W
53°C	32.4 W	11.6 W	44.0 W
55°C	38.2 W	13.7 W	52.0 W
57°C	44.1 W	15.8 W	60.0 W
59°C	50.0 W	17.9 W	68.0 W
61°C	55.9 W	20.0 W	76.0 W
63°C	61.8 W	22.1 W	84.0 W
65°C	67.0 W	24.2 W	92.0 W
67°C	N/A	26.3 W	95.0 W
69°C	N/A	28.4 W	N/A
71°C	N/A	30.0 W	N/A

Thermal Profile	G	H	I
Thermal Resistance (case to ambient)	0.51°C/W	0.22°C/W	0.20°C/W
Local Ambient Temperature	42°C	42°C	42°C
Tcase Max	Power (Thermal Profile G)	Power (Thermal Profile H)	Power (Thermal Profile I)
49°C	13.7 W	31.8 W	35.0 W
51°C	17.6 W	40.9 W	45.0 W
53°C	21.6 W	50.0 W	55.0 W
55°C	25.5 W	59.1 W	65.0 W
57°C	29.4 W	68.2 W	75.0 W
59°C	33.3 W	77.3 W	85.0 W
61°C	37.3 W	86.4 W	95.0 W
63°C	41.2 W	95.5 W	105.0 W
65°C	45.1 W	104.0 W	110.0 W
67°C	49.0 W	N/A	N/A
69°C	52.9 W	N/A	N/A
71°C	55.0 W	N/A	N/A

Note: The thermal profile is used to define the relationship between Tcase max and device-specific Thermal Design Power for Rev. E and later processors with “Variable” indicated by the Case Temperature OPN character.

Table 10: AMD Opteron™ Processor BIOS Specifications - Rev CG

Parameter/OPN	Notes	OS A140CEP5AT OS A240CEP5AU OS A840CEP5AV			OS A142CEP5AT OS A242CEP5AU OS A842CEP5AV			OS A144CEP5AT OS A244CEP5AU OS A844CEP5AV		
		140	240	840	142	242	842	144	244	844
Model Number		140	240	840	142	242	842	144	244	844
CPUID 8000_0001h EBX [11:6] (BrandID)	1	0Ch	10h	14h	0Ch	10h	14h	0Ch	10h	14h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00000F5Ah			00000F5Ah			00000F5Ah		
L2 Cache Size		1 MB			1 MB			1 MB		
FID/VID Status MaxFID Field	2	06h			08h			0Ah		
FID/VID Status StartFID Field	2	06h			08h			0Ah		
Max P-State		1400 MHz			1600 MHz			1800 MHz		
FID/VID Status MaxVID Field	2	00h			00h			00h		
FID/VID Status StartVID Field	2	02h			02h			02h		
VID Code		02h			02h			02h		
VID_VDD	4	1.500 V			1.500 V			1.500 V		
Thermal Design Power	5	82.1 W			82.1 W			82.1 W		
Intermediate P-State #1	6	N/A			N/A			N/A		
VID Code / VID_VDD	4									
Thermal Design Power	5									
Intermediate P-State #2	6	N/A			N/A			N/A		
VID Code / VID_VDD	4									
Thermal Design Power	5									
Intermediate P-State #3	6	N/A			N/A			N/A		
VID Code / VID_VDD	4									
Thermal Design Power	5									
Min P-State		N/A			N/A			1000 MHz		
VID Code / VID_VDD	4							0Eh	1.200 V	
Thermal Design Power	5							28.0 W		

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSA146CEP5AT OSA246CEP5AU OSA846CEP5AV			OSA148CEP5AT OSA248CEP5AU OSA848CEP5AV			OSA150CEP5AT OSA250CEP5AU OSA850CEP5AV		
Model Number		146	246	846	148	248	848	150	250	850
CPUID 8000_0001h EBX [11:6] (BrandID)	1	0Ch	10h	14h	0Ch	10h	14h	0Ch	10h	14h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00000F5Ah			00000F5Ah			00000F5Ah		
L2 Cache Size		1 MB			1 MB			1 MB		
FID/VID Status MaxFID Field	2	0Ch			0Eh			10h		
FID/VID Status StartFID Field	2	0Ch			0Eh			10h		
Max P-State		2000 MHz			2200 MHz			2400 MHz		
FID/VID Status MaxVID Field	2	00h			00h			00h		
FID/VID Status StartVID Field	2	02h			02h			02h		
VID Code		02h			02h			02h		
VID_VDD	4	1.500 V			1.500 V			1.500 V		
Thermal Design Power	5	89.0 W			89.0 W			89.0 W		
Intermediate P-State #1	6	1800 MHz			2000 MHz			2200 MHz		
VID Code / VID_VDD	4	06h	1.400 V		06h	1.400 V		06h	1.400 V	
Thermal Design Power	5	66.0 W			70.0 W			83.0 W		
Intermediate P-State #2	6	N/A			1800 MHz			2000 MHz		
VID Code / VID_VDD	4				0Ah	1.300 V		0Ah	1.300 V	
Thermal Design Power	5				47.0 W			55.0 W		
Intermediate P-State #3	6	N/A			N/A			1800 MHz		
VID Code / VID_VDD	4							0Ch	1.250 V	
Thermal Design Power	5							42.0 W		
Min P-State		1000 MHz			1000 MHz			1000 MHz		
VID Code / VID_VDD	4	0Eh	1.200 V		0Eh	1.200 V		0Eh	1.200 V	
Thermal Design Power	5	28.0 W			28.0 W			28.0 W		

The notes for this table appear on page 24.

Table 11: AMD Opteron™ Processor BIOS Specifications - Rev E Single Core

Parameter/OPN	Notes	OS A254FAA5BL OS A854FAA5BM	
Model Number		254	854
CPUID 8000_0001h EBX [11:6] (BrandID)	1	10h	14h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F51h	
L2 Cache Size		1 MB	
FID/VID Status MaxFID Field	2	14h	
FID/VID Status StartFID Field	2	14h	
Max HyperTransport Frequency		800 MHz	
Max P-State		2800 MHz	
FID/VID Status MaxVID Field	2, 3	06h	04h
FID/VID Status StartVID Field	2, 3	08h	06h
VID Code		08h	06h
VID_VDD	4	1.350 V	1.400 V
Thermal Design Power	5	92.6 W	
Intermediate P-State #1	6	2600 MHz	
VID Code / VID_VDD	4	08h	1.350 V
Thermal Design Power	5	90.2 W	
Intermediate P-State #2	6	2400 MHz	
VID Code / VID_VDD	4	0Ah	1.300 V
Thermal Design Power	5	77.0 W	
Intermediate P-State #3	6	2200 MHz	
VID Code / VID_VDD	4	0Ch	1.250 V
Thermal Design Power	5	65.7 W	
Intermediate P-State #4	6	2000 MHz	
VID Code / VID_VDD	4	0Eh	1.200 V
Thermal Design Power	5	55.9 W	
Intermediate P-State #5	6	1800 MHz	
VID Code / VID_VDD	4	10h	1.150 V
Thermal Design Power	5	47.6 W	
Intermediate P-State #6	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Min P-State		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V
Thermal Design Power	5	36.1 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OS K246FAA5BL OS K846FAA5BM		OS K848FAA5BM			OS K250FAA5BL OS K850FAA5BM	
Model Number		246	846	148	248	848	250	850
CPUID 8000_0001h EBX [11:6] (BrandID)	1	12h	16h	0Eh	12h	16h	12h	16h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F51h		00020F51h			00020F51h	
L2 Cache Size		1 MB		1 MB			1 MB	
FID/VID Status MaxFID Field	2	0Ch		0Eh			10h	
FID/VID Status StartFID Field	2	0Ch		0Eh			10h	
Max P-State		2000 MHz		2200 MHz			2400 MHz	
FID/VID Status MaxVID Field	2, 3	06h	04h	06h	04h		06h	04h
FID/VID Status StartVID Field	2, 3	08h	06h	08h	06h		08h	06h
VID Code		08h	06h	08h	06h		08h	06h
VID_VDD	4	1.350 V	1.400 V	1.350 V	1.400 V		1.350 V	1.400 V
Thermal Design Power	5	54.7 W		54.7 W			54.7 W	
Intermediate P-State #1	6	1800 MHz		2000 MHz			2200 MHz	
VID Code / VID_VDD	4	08h	1.350 V	08h	1.350 V		08h	1.350 V
Thermal Design Power	5	46.1 W		52.1 W			52.1 W	
Intermediate P-State #2	6	N/A		1800 MHz			2000 MHz	
VID Code / VID_VDD	4			0Ah	1.300 V		0Ah	1.300 V
Thermal Design Power	5			45.9 W			44.0 W	
Intermediate P-State #3	6	N/A		N/A			1800 MHz	
VID Code / VID_VDD	4						0Ch	1.250 V
Thermal Design Power	5						37.9 W	
Intermediate P-State #4	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5							
Intermediate P-State #5	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5							
Intermediate P-State #6	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5							
Min P-State		1000 MHz		1000 MHz			1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V	12h	1.100 V		12h	1.100 V
Thermal Design Power	5	22.3 W		21.1 W			19.9 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OS A144DAA5BN		OS A148DAA5BN	
Model Number		144		148	
CPUID 8000_0001h EBX [11:6] (BrandID)	1	0Ch		0Ch	
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F71h		00020F71h	
L2 Cache Size		1 MB		1 MB	
FID/VID Status MaxFID Field	2	0Ah		0Eh	
FID/VID Status StartFID Field	2	0Ah		0Eh	
Max P-State		1800 MHz		2200 MHz	
FID/VID Status MaxVID Field	2, 3	06h	04h	06h	04h
FID/VID Status StartVID Field	2, 3	08h	06h	08h	06h
VID Code		08h	06h	08h	06h
VID_VDD	4	1.350 V	1.400 V	1.350 V	1.400 V
Thermal Design Power	5	67.0 W		85.3 W	
Intermediate P-State #1	6	N/A		2000 MHz	
VID Code / VID_VDD	4			08h	1.350 V
Thermal Design Power	5			83.0 W	
Intermediate P-State #2	6	N/A		1800 MHz	
VID Code / VID_VDD	4			0Ah	1.300 V
Thermal Design Power	5			70.4 W	
Intermediate P-State #3	6	N/A		N/A	
VID Code / VID_VDD	4				
Thermal Design Power	5				
Intermediate P-State #4	6	N/A		N/A	
VID Code / VID_VDD	4				
Thermal Design Power	5				
Intermediate P-State #5	6	N/A		N/A	
VID Code / VID_VDD	4				
Thermal Design Power	5				
Intermediate P-State #6	6	N/A		N/A	
VID Code / VID_VDD	4				
Thermal Design Power	5				
Min P-State		1000 MHz		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V	12h	1.100 V
Thermal Design Power	5	29.6 W		36.1 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSA152DAA5BN	
Model Number		152	
CPUID 8000_0001h EBX [11:6] (BrandID)	1	0Ch	
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F71h	
L2 Cache Size		1 MB	
FID/VID Status MaxFID Field	2	12h	
FID/VID Status StartFID Field	2	12h	
Max P-State		2600 MHz	
FID/VID Status MaxVID Field	2, 3	06h	04h
FID/VID Status StartVID Field	2, 3	08h	06h
VID Code		08h	06h
VID_VDD	4	1.350 V	1.400 V
Thermal Design Power	5	104.0 W	
Intermediate P-State #1	6	2400 MHz	
VID Code / VID_VDD	4	08h	1.350 V
Thermal Design Power	5	101.6 W	
Intermediate P-State #2	6	2200 MHz	
VID Code / VID_VDD	4	0Ah	1.300 V
Thermal Design Power	5	86.3 W	
Intermediate P-State #3	6	2000 MHz	
VID Code / VID_VDD	4	0Ch	1.250 V
Thermal Design Power	5	73.2 W	
Intermediate P-State #4	6	1800 MHz	
VID Code / VID_VDD	4	0Eh	1.200 V
Thermal Design Power	5	62.1 W	
Intermediate P-State #5	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Intermediate P-State #6	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Min P-State		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V
Thermal Design Power	5	41.9 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OS A146DAA5BN		OS A150DAA5BN		OS A154DAA5BN	
Model Number		146		150		154	
CPUID 8000_0001h EBX [11:6] (BrandID)	1	0Ch		0Ch		0Ch	
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F71h		00020F71h		00020F71h	
L2 Cache Size		1 MB		1 MB		1 MB	
FID/VID Status MaxFID Field	2	0Ch		10h		14h	
FID/VID Status StartFID Field	2	0Ch		10h		14h	
Max P-State		2000 MHz		2400 MHz		2800 MHz	
FID/VID Status MaxVID Field	2, 3	06h	04h	06h	04h	06h	04h
FID/VID Status StartVID Field	2, 3	08h	06h	08h	06h	08h	06h
VID Code		08h	06h	08h	06h	08h	06h
VID_VDD	4	1.350 V	1.400 V	1.350 V	1.400 V	1.350 V	1.400 V
Thermal Design Power	5	67.0 W		85.3 W		104.0 W	
Intermediate P-State #1	6	1800 MHz		2200 MHz		2600 MHz	
VID Code / VID_VDD	4	08h	1.350 V	08h	1.350 V	08h	1.350 V
Thermal Design Power	5	64.7 W		83.0 W		101.7 W	
Intermediate P-State #2	6	N/A		2000 MHz		2400 MHz	
VID Code / VID_VDD	4			0Ah	1.300 V	0Ah	1.300 V
Thermal Design Power	5			70.6 W		86.8 W	
Intermediate P-State #3	6	N/A		1800 MHz		2200 MHz	
VID Code / VID_VDD	4			0Ch	1.250 V	0Ch	1.250 V
Thermal Design Power	5			59.6 W		74.0 W	
Intermediate P-State #4	6	N/A		N/A		2000 MHz	
VID Code / VID_VDD	4					0Eh	1.200 V
Thermal Design Power	5					63.0 W	
Intermediate P-State #5	6	N/A		N/A		1800 MHz	
VID Code / VID_VDD	4					10h	1.150 V
Thermal Design Power	5					53.7 W	
Intermediate P-State #6	6	N/A		N/A		N/A	
VID Code / VID_VDD	4						
Thermal Design Power	5						
Min P-State		1000 MHz		1000 MHz		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V	12h	1.100 V	12h	1.100 V
Thermal Design Power	5	28.6 W		35.0 W		41.6 W	

The notes for this table appear on page 24.

AMD Opteron™ Processor BIOS Specifications - Rev E Dual-Core

Parameter/OPN	Notes	OSA865FAA6CC			OSA870FAA6CC		OSA875FAA6CC	
Model Number		165	265	865	270	870	275	875
CPUID 8000_0001h EBX [11:6] (BrandID)	1	2Ch	30h	34h	30h	34h	30h	34h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F12h			00020F12h		00020F12h	
L2 Cache Size		2 MB			2 MB		2 MB	
FID/VID Status MaxFID Field	2	0Ah			0Ch		0Eh	
FID/VID Status StartFID Field	2	0Ah			0Ch		0Eh	
Max HyperTransport Frequency		800 MHz			800 MHz		800 MHz	
Max P-State		1800 MHz			2000 MHz		2200 MHz	
FID/VID Status MaxVID Field	2, 3	08h	06h		08h	06h	08h	06h
FID/VID Status StartVID Field	2, 3	0Ah	08h		0Ah	08h	0Ah	08h
VID Code		0Ah	08h		0Ah	08h	0Ah	08h
VID_VDD	4	1.350 V	0.000 V		1.350 V	0.000 V	1.350 V	0.000 V
Thermal Design Power	5, 8	95.0 W			95.0 W		95.0 W	
Intermediate P-State #1	6	N/A			1800 MHz		2000 MHz	
VID Code / VID_VDD	4				0Ah	1.300 V	0Ah	1.300 V
Thermal Design Power	5, 8				90.3 W		90.3 W	
Intermediate P-State #2	6	N/A			N/A		1800 MHz	
VID Code / VID_VDD	4						0Ch	1.250 V
Thermal Design Power	5, 8						75.9 W	
Intermediate P-State #3	6	N/A			N/A		N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #4	6	N/A			N/A		N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #5	6	N/A			N/A		N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #6	6	N/A			N/A		N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Min P-State		1000 MHz			1000 MHz		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V		12h	1.100 V	12h	1.100 V
Thermal Design Power	5, 8	40.6 W			38.3 W		36.1 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSA280FAA6CB OSA880FAA6CC	
Model Number		280	880
CPUID 8000_0001h EBX [11:6] (BrandID)	1	30h	34h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F12h	
L2 Cache Size		2 MB	
FID/VID Status MaxFID Field	2	10h	
FID/VID Status StartFID Field	2	10h	
Max HyperTransport Frequency		800 MHz	
Max P-State		1800 MHz	
FID/VID Status MaxVID Field	2, 3	08h	06h
FID/VID Status StartVID Field	2, 3	0Ah	08h
VID Code		0Ah	08h
VID_VDD	4	1.350 V	1.400 V
Thermal Design Power	5, 8	92.6 W	
Intermediate P-State #1	6	2400 MHz	
VID Code / VID_VDD	4	0Ah	1.350 V
Thermal Design Power	5, 8	90.0 W	
Intermediate P-State #2	6	2200 MHz	
VID Code / VID_VDD	4	0Ch	1.300 V
Thermal Design Power	5, 8	76.6 W	
Intermediate P-State #3	6	2000 MHz	
VID Code / VID_VDD	4	0Eh	1.250 V
Thermal Design Power	5, 8	65.1 W	
Intermediate P-State #4	6	1800 MHz	
VID Code / VID_VDD	4		1.200 V
Thermal Design Power	5, 8	55.2 W	
Intermediate P-State #5	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5, 8		
Intermediate P-State #6	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5, 8		
Min P-State		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V
Thermal Design Power	5, 8	32.0 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSA165DAA6CD		OSA170DAA6CD		OSA175DAA6CD	
Model Number		165		170		175	
CPUID 8000_0001h EBX [11:6] (BrandID)	1	2Ch		2Ch		2Ch	
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F32h		00020F32h		00020F32h	
L2 Cache Size		2 MB		2 MB		2 MB	
FID/VID Status MaxFID Field	2	0Ah		0Ch		0Eh	
FID/VID Status StartFID Field	2	0Ah		0Ch		0Eh	
Max P-State		1800 MHz		2000 MHz		2200 MHz	
FID/VID Status MaxVID Field	2, 3	08h	06h	08h	06h	08h	06h
FID/VID Status StartVID Field	2, 3	0Ah	08h	0Ah	08h	0Ah	08h
VID Code		0Ah	08h	0Ah	08h	0Ah	08h
VID_VDD	4	1.300 V	1.350 V	1.300 V	1.350 V	1.300 V	1.350 V
Thermal Design Power	5	110.0 W		110.0 W		110.0 W	
Intermediate P-State #1	6	N/A		1800 MHz		2000 MHz	
VID Code / VID_VDD	4			0Ah	1.300 V	0Ah	1.300 V
Thermal Design Power	5			105.6 W		105.6 W	
Intermediate P-State #2	6	N/A		N/A		1800 MHz	
VID Code / VID_VDD	4					0Ch	1.250 V
Thermal Design Power	5					89.1 W	
Intermediate P-State #3	6	N/A		N/A		N/A	
VID Code / VID_VDD	4						
Thermal Design Power	5						
Intermediate P-State #4	6	N/A		N/A		N/A	
VID Code / VID_VDD	4						
Thermal Design Power	5						
Intermediate P-State #5	6	N/A		N/A		N/A	
VID Code / VID_VDD	4						
Thermal Design Power	5						
Intermediate P-State #6	6	N/A		N/A		N/A	
VID Code / VID_VDD	4						
Thermal Design Power	5						
Min P-State		1000 MHz		1000 MHz		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V	12h	1.100 V	12h	1.100 V
Thermal Design Power	5	51.6 W		51.4 W		49.0 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSK260FAA6CB OSK860FAA6CC		OSK265FAA6CB OSK865FAA6CC			OSK270FAA6CB OSK870FAA6CC	
Model Number		260	860	165	265	865	270	870
CPUID 8000_0001h EBX [11:6] (BrandID)	1	32h	36h	2Eh	32h	36h	32h	36h
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F12h		00020F12h			00020F12h	
L2 Cache Size		2 MB		2 MB			2 MB	
FID/VID Status MaxFID Field	2	08h		0Ah			0Ch	
FID/VID Status StartFID Field	2	08h		0Ah			0Ch	
Max HyperTransport Frequency		800 MHz		800 MHz			800 MHz	
Max P-State		1600 MHz		1800 MHz			2000 MHz	
FID/VID Status MaxVID Field	2, 3	0Eh	0Ch	0Eh	0Ch		0Eh	0Ch
FID/VID Status StartVID Field	2, 3	10h	0Eh	10h	0Eh		10h	0Eh
VID Code		10h	0Eh	10h	0Eh		10h	0Eh
VID_VDD	4	1.150 V	1.200 V	1.150 V	1.200 V		1.150 V	1.200 V
Thermal Design Power	5, 8	55.0 W		55.0 W			55.0 W	
Intermediate P-State #1	6	N/A		N/A			1800 MHz	
VID Code / VID_VDD	4						10h	1.150 V
Thermal Design Power	5, 8						52.0 W	
Intermediate P-State #2	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #3	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #4	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #5	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Intermediate P-State #6	6	N/A		N/A			N/A	
VID Code / VID_VDD	4							
Thermal Design Power	5, 8							
Min P-State		N/A		1000 MHz			1000 MHz	
VID Code / VID_VDD	4			12h	1.100 V		12h	1.100 V
Thermal Design Power	5, 8			36.5 W			33.5 W	

The notes for this table appear on page 24.

Parameter/OPN	Notes	OSA180DAA6CD	
Model Number		180	
CPUID 8000_0001h EBX [11:6] (BrandID)	1	2Ch	
CPUID 8000_0001h EAX [31:0] (CPUID)	1	00020F32h	
L2 Cache Size		2 MB	
FID/VID Status MaxFID Field	2	10h	
FID/VID Status StartFID Field	2	10h	
Max P-State		2400 MHz	
FID/VID Status MaxVID Field	2, 3	08h	06h
FID/VID Status StartVID Field	2, 3	0Ah	08h
VID Code		0Ah	08h
VID_VDD	4	1.300 V	1.350 V
Thermal Design Power	5	110.0 W	
Intermediate P-State #1	6	2200 MHz	
VID Code / VID_VDD	4	0Ah	1.300 V
Thermal Design Power	5	105.6 W	
Intermediate P-State #2	6	2000 MHz	
VID Code / VID_VDD	4	0Ch	1.250 V
Thermal Design Power	5	89.1 W	
Intermediate P-State #3	6	1800 MHz	
VID Code / VID_VDD	4	0Eh	1.200 V
Thermal Design Power	5	74.8 W	
Intermediate P-State #4	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Intermediate P-State #5	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Intermediate P-State #6	6	N/A	
VID Code / VID_VDD	4		
Thermal Design Power	5		
Min P-State		1000 MHz	
VID Code / VID_VDD	4	12h	1.100 V
Thermal Design Power	5	46.6 W	

The notes for this table appear on page 24.

Notes:

1. CUID extended function 8000_0001h fields are used by BIOS in uniquely associating a given processor to the P-states that are valid for that processor. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. FIDVID Status Register, MSR C001_0042h.
3. StartVID and MaxVID are programmed during device manufacturing with part-specific values for Rev E and later processors with 'Variable' indicated by the Operating Voltage OPN character, and can have one or more valid options. All valid options for StartVID, MaxVID, and VID_VDD will be specified for the corresponding OPN. For information on the relationship of StartVID and MaxVID to VID_VDD refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
4. The VID_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
5. Thermal Design Power (TDP) is measured under the conditions of Tcase Max and VDD=VID_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA. Contact your Field Application Engineer for more information on TDP specifications.
6. Implementation of this P-state is optional in BIOS.
7. Limited availability.
8. Thermal Design Power (TDP) specifications for dual core processors assume equivalent P-states (Voltage and frequency) and equivalent Tcase conditions for both cores. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094, for details on P-state operation for dual core processors.

1.2 AMD Opteron™ Processor Thermal/Power Specifications

The tables in this section contain the power and thermal specifications for this processor family. Each column in the thermal/power specification tables represents a specific Ordering Part Number (OPN). Section 1.1 provides an example of the OPN structure for this processor family.

Table 12: AMD Opteron™ Processor Thermal/Power Specifications - Rev B3

Parameter/OPN	Notes	OSA140CCO5AG OSA240CCO5AH OSA840CCO5AI			OSA142CCO5AG OSA242CCO5AH OSA842CCO5AI			OSA144CCO5AG OSA244CCO5AH OSA844CCO5AI		
		140	240	840	142	242	842	144	244	844
Model Number		140	240	840	142	242	842	144	244	844
L2 Cache Size		1 MB			1 MB			1 MB		
Tcase Max	1	69°C			69°C			69°C		
Tcontrol Max	3	N/A			N/A			N/A		
Tambient		42°C			42°C			42°C		
Max Frequency		1400 MHz			1600 MHz			1800 MHz		
VID_VDD	4	1.550 V			1.550 V			1.550 V		
IDD Max		52.0 A			52.0 A			52.0 A		
Thermal Design Power	5	84.7 W			84.7 W			84.7 W		
Thermal Resistance (case to ambient)		0.32°C/W			0.32°C/W			0.32°C/W		
Halt/Stop Grant	7									
IDDC1 Max		39.7 A			39.7 A			39.7 A		
I/O Power	10	4.1 W			4.1 W			4.1 W		
S3	9									
I/O Power	9, 11	1.4 W			1.4 W			1.4 W		

The notes for this table appear on page 40.

Table 13: AMD Opteron™ Processor Thermal/Power Specifications - Rev C0

Parameter/OPN	Notes	OSA140CEP5AK OSA240CEP5AL OSA840CEP5AM			OSA142CEP5AK OSA242CEP5AL OSA842CEP5AM			OSA144CEP5AK OSA244CEP5AL OSA844CEP5AM		
		140	240	840	142	242	842	144	244	844
Model Number										
L2 Cache Size		1 MB			1 MB			1 MB		
Tcase Max	1	70°C			70°C			70°C		
Tcontrol Max	3	N/A			N/A			N/A		
Tambient		42°C			42°C			42°C		
Max Frequency		1400 MHz			1600 MHz			1800 MHz		
VID_VDD	4	1.500 V			1.500 V			1.500 V		
IDD Max		52.0 A			52.0 A			52.0 A		
Thermal Design Power	5	82.1 W			82.1 W			82.1 W		
Thermal Resistance (case to ambient)		0.34°C/W			0.34°C/W			0.34°C/W		
Halt/Stop Grant	7									
IDDC1 Max		32.5 A			32.5 A			32.5 A		
I/O Power	10	4.1 W			4.1 W			4.1 W		
S3	9									
I/O Power	9, 11	1.4 W			1.4 W			1.4 W		

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA146CEP5AK OSA246CEP5AL OSA846CEP5AM			OSA148CEP5AK OSA248CEP5AL OSA848CEP5AM		
		146	246	846	148	248	848
Model Number							
L2 Cache Size		1 MB			1 MB		
Tcase Max	1	70°C			70°C		
Tcontrol Max	3	N/A			70°C		
Tambient		42°C			42°C		
Max Frequency		2000 MHz			2200 MHz		
VID_VDD	4	1.500 V			1.500 V		
IDD Max		56.5 A			56.5 A		
Thermal Design Power	5	89.0 W			89.0 W		
Thermal Resistance (case to ambient)		0.31°C/W			0.31°C/W		
Halt/Stop Grant	7						
IDDC1 Max		32.5 A			32.5 A		
I/O Power	10	4.1 W			4.1 W		
S3	9						
I/O Power	9, 11	1.4 W			1.4 W		

The notes for this table appear on page 40.

Table 14: AMD Opteron™ Processor Thermal/Power Specifications - Rev CG

Parameter/OPN	Notes	OSA140CEP5AT OSA240CEP5AU OSA840CEP5AV	OSA142CEP5AT OSA242CEP5AU OSA842CEP5AV	OSA144CEP5AT OSA244CEP5AU OSA844CEP5AV
Tcase Max	1	70°C	70°C	70°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.34°C/W	0.34°C/W	0.34°C/W
Max P-State		1400 MHz	1600 MHz	1800 MHz
VID_VDD	4	1.500 V	1.500 V	1.500 V
IDD Max		52.0 A	52.0 A	52.0 A
Thermal Design Power	5	82.1 W	82.1 W	82.1 W
Intermediate P-State #1	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #2	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #3	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Min P-State		N/A	N/A	1000 MHz
VID_VDD	4			1.200 V
IDD Max				19.9 A
Thermal Design Power	5			28.0 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7	32.5 A	32.5 A	32.5 A
IDDC1 Max @ Min P-State	8	N/A	N/A	8.2 A
I/O Power	10	4.1 W	4.1 W	4.1 W
S3	9			
I/O Power	9, 11	750 mW	750 mW	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA146CEP5AT OSA246CEP5AU OSA846CEP5AV	OSA148CEP5AT OSA248CEP5AU OSA848CEP5AV	OSA150CEP5AT OSA250CEP5AU OSA850CEP5AV
Tcase Max	1	70°C	70°C	70°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.31°C/W	0.31°C/W	0.31°C/W
Max P-State		2000 MHz	2200 MHz	2400 MHz
VID_VDD	4	1.500 V	1.500 V	1.500 V
IDD Max		56.5 A	56.5 A	56.5 A
Thermal Design Power	5	89.0 W	89.0 W	89.0 W
Intermediate P-State #1	12	1800 MHz	2000 MHz	2200 MHz
VID_VDD	4	1.400 V	1.400 V	1.400 V
IDD Max		44.2 A	47.1 A	56.4 A
Thermal Design Power	5	66.0 W	70.0 W	83.0 W
Intermediate P-State #2	12	N/A	1800 MHz	2000 MHz
VID_VDD	4		1.300 V	1.300 V
IDD Max			33.0 A	39.2 A
Thermal Design Power	5		47.0 W	55.0 W
Intermediate P-State #3	12	N/A	N/A	1800 MHz
VID_VDD	4			1.250 V
IDD Max				30.3 A
Thermal Design Power	5			42.0 W
Min P-State		1000 MHz	1000 MHz	1000 MHz
VID_VDD	4	1.200 V	1.200 V	1.200 V
IDD Max		19.9 A	19.9 A	19.9 A
Thermal Design Power	5	28.0 W	28.0 W	28.0 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7	32.5 A	32.5 A	32.5 A
IDDC1 Max @ Min P-State	8	8.2 A	8.2 A	8.2 A
I/O Power	10	4.1 W	4.1 W	4.1 W
S3	9			
I/O Power	9, 11	750 mW	750 mW	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSK146CMP5AT OSK246CMP5AU OSK846CMP5AV		
Model Number		146	246	846
L2 Cache Size		1 MB		
Tcase Max	1	70°C		
Tcontrol Max	3	70°C		
Tambient		42°C		
Max Frequency		2000 MHz		
VID_VDD	4	1.300 V		
IDD Max		39.2 A		
Thermal Design Power	5	55.0 W		
Thermal Resistance (case to ambient)		0.50°C/W		
Halt/Stop Grant	7			
IDDC1 Max		19.0 A		
I/O Power	10	4.1 W		
S3	9			
I/O Power	9, 11	750 mW		

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSB140CSP5AT OSB240CSP5AU OSB840CSP5AV		
Model Number		140	240	840
L2 Cache Size		1 MB		
Tcase Max	1	70°C		
Tcontrol Max	3	70°C		
Tambient		42°C		
Max Frequency		1400 MHz		
VID_VDD	4	1.150 V		
IDD Max		22.5 A		
Thermal Design Power	5	30.0 W		
Thermal Resistance (case to ambient)		0.92°C/W		
Halt/Stop Grant	7			
IDDC1 Max		13.0 A		
I/O Power	10	4.1 W		
S3	9			
I/O Power	9, 11	750 mW		

The notes for this table appear on page 40.

Table 15: AMD Opteron™ Processor Thermal/Power Specifications - Rev E Single-Core

Parameter/OPN	Notes	OSA254FAA5BL OSA854FAA5BM
Tcase Max	1, 2	49°C to 67°C
Tcontrol Max	3	70°C
Tambient		42°C
Thermal Resistance (case to ambient)		0.27°C/W
Thermal Profile	6	B
Max P-State		2800 MHz
VID_VDD	4	1.350 V 1.400 V
IDD Max	6	66.1 A
Thermal Design Power	5, 6	92.6 W
Intermediate P-State #1	12	2600 MHz
VID_VDD	4	1.350 V
IDD Max		64.4 A
Thermal Design Power	5	90.2 W
Intermediate P-State #2	12	2400 MHz
VID_VDD	4	1.300 V
IDD Max		56.7 A
Thermal Design Power	5	77.0 W
Intermediate P-State #3	12	2200 MHz
VID_VDD	4	1.250 V
IDD Max		49.9 A
Thermal Design Power	5	65.7 W
Intermediate P-State #4	12	2000 MHz
VID_VDD	4	1.200 V
IDD Max		43.8 A
Thermal Design Power	5	55.9 W
Intermediate P-State #5	12	1800 MHz
VID_VDD	4	1.150 V
IDD Max		38.5 A
Thermal Design Power	5	47.6 W
Intermediate P-State #6	12	N/A
VID_VDD	4	
IDD Max		
Thermal Design Power	5	
Min P-State		1000 MHz
VID_VDD	4	1.100 V
IDD Max		29.8 A
Thermal Design Power	5	36.1 W
Halt/Stop Grant		
IDDC1 Max @ Max P-State	7	38.1 A
IDDC1 Max @ Min P-State	8	7.8 A
I/O Power	10	3.3 W
S3	9	
I/O Power	9, 11	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OS K246FAA5BL OS K846FAA5BM	OS K848FAA5BM	OS K250FAA5BL OS K850FAA5BM
Tcase Max	1, 2	49°C to 71°C	49°C to 71°C	49°C to 71°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.53°C/W	0.53°C/W	0.53°C/W
Thermal Profile	6	C	C	C
Max P-State		2000 MHz	2200 MHz	2400 MHz
VID_VDD	4	1.350 V 1.400 V	1.350 V 1.400 V	1.350 V 1.400 V
IDD Max	6	38.1 A	38.1 A	38.1 A
Thermal Design Power	5, 6	54.7 W	54.7 W	54.7 W
Intermediate P-State #1	12	1800 MHz	2000 MHz	2200 MHz
VID_VDD	4	1.350 V	1.350 V	1.350 V
IDD Max		31.7 A	36.1 A	36.1 A
Thermal Design Power	5	46.1 W	52.1 W	52.1 W
Intermediate P-State #2	12	N/A	1800 MHz	2000 MHz
VID_VDD	4		1.300 V	1.300 V
IDD Max			32.8 A	31.3 A
Thermal Design Power	5		45.9 W	44.0 W
Intermediate P-State #3	12	N/A	N/A	1800 MHz
VID_VDD	4			1.250 V
IDD Max				27.7 A
Thermal Design Power	5			37.9 W
Intermediate P-State #4	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #5	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #6	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Min P-State		1000 MHz	1000 MHz	1000 MHz
VID_VDD	4	1.100 V	1.100 V	1.100 V
IDD Max		17.3 A	16.2 A	15.1 A
Thermal Design Power	5	22.3 W	21.1 W	19.9 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7	19.3 A	19.3 A	19.3 A
IDDC1 Max @ Min P-State	8	4.2 A	4.2 A	4.2 A
I/O Power	10	3.3 W	3.3 W	3.3 W
S3	9			
I/O Power	9, 11	750 mW	750 mW	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA144DAA5BN	OSA148DAA5BN
Tcase Max	1, 2	49°C to 71°C	49°C to 71°C
Tcontrol Max	3	70°C	70°C
Tambient		42°C	42°C
Thermal Resistance (case to ambient)		0.34°C/W	0.34°C/W
Thermal Profile	6	D	A
Max P-State		1800 MHz	2200 MHz
VID_VDD	4	1.350 V 1.400 V	1.350 V 1.400 V
IDD Max	6	47.5 A	60.0 A
Thermal Design Power	5, 6	67.0 W	85.3 W
Intermediate P-State #1	12	N/A	2000 MHz
VID_VDD	4		1.350 V
IDD Max			59.3 A
Thermal Design Power	5		83.0 W
Intermediate P-State #2	12	N/A	1800 MHz
VID_VDD	4		1.300 V
IDD Max			51.9 A
Thermal Design Power	5		70.4 W
Intermediate P-State #3	12	N/A	N/A
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Intermediate P-State #4	12	N/A	N/A
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Intermediate P-State #5	12	N/A	N/A
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Intermediate P-State #6	12	N/A	N/A
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Min P-State		1000 MHz	1000 MHz
VID_VDD	4	1.100 V	1.100 V
IDD Max		24.3 A	30.2 A
Thermal Design Power	5	29.6 W	36.1 W
Halt/Stop Grant			
IDDC1 Max @ Max P-State	7	19.3 A	34.8 A
IDDC1 Max @ Min P-State	8	4.2 A	7.1 A
I/O Power	10	2.9 W	2.9 W
S3	9		
I/O Power	9, 11	500 mW	500 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA152DAA5BN	
Tcase Max	1, 2	49°C to 65°C	
Tcontrol Max	3	70°C	
Tambient		42°C	
Thermal Resistance (case to ambient)		0.22°C/W	
Thermal Profile	6	H	
Max P-State		2600 MHz	
VID_VDD	4	1.350 V	1.400 V
IDD Max	6	74.9 A	
Thermal Design Power	5, 6	104.0 W	
Intermediate P-State #1	12	2400 MHz	
VID_VDD	4	1.350 V	
IDD Max		73.1 A	
Thermal Design Power	5	101.6 W	
Intermediate P-State #2	12	2200 MHz	
VID_VDD	4	1.300 V	
IDD Max		64.2 A	
Thermal Design Power	5	86.3 W	
Intermediate P-State #3	12	2000 MHz	
VID_VDD	4	1.250 V	
IDD Max		56.2 A	
Thermal Design Power	5	73.2 W	
Intermediate P-State #4	12	1800 MHz	
VID_VDD	4	1.200 V	
IDD Max		49.3 A	
Thermal Design Power	5	62.1 W	
Intermediate P-State #5	12	N/A	
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Intermediate P-State #6	12	N/A	
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Min P-State		1000 MHz	
VID_VDD	4	1.100 V	
IDD Max		35.5 A	
Thermal Design Power	5	41.9 W	
Halt/Stop Grant			
IDDC1 Max @ Max P-State	7	38.1 A	
IDDC1 Max @ Min P-State	8	7.8 A	
I/O Power	10	2.9 W	
S3	9		
I/O Power	9, 11	500 mW	

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA146DAA5BN	OSA150DAA5BN	OSA154DAA5BN
Tcase Max	1, 2	49°C to 65°C	49°C to 71°C	49°C to 65°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.34°C/W	0.34°C/W	0.22°C/W
Thermal Profile	6	D	A	H
Max P-State		2000 MHz	2400 MHz	2800 MHz
VID_VDD	4	1.350 V 1.400 V	1.350 V 1.400 V	1.350 V 1.400 V
IDD Max	6	47.5 A	60.0 A	74.9 A
Thermal Design Power	5, 6	67.0 W	85.3 W	104.0 W
Intermediate P-State #1	12	1800 MHz	2200 MHz	2600 MHz
VID_VDD	4	1.350 V	1.350 V	1.350 V
IDD Max		45.8 A	59.3 A	73.2 A
Thermal Design Power	5	64.7 W	83.0 W	101.7 W
Intermediate P-State #2	12	N/A	2000 MHz	2400 MHz
VID_VDD	4		1.300 V	1.300 V
IDD Max			52.1 A	64.5 A
Thermal Design Power	5		70.6 W	86.8 W
Intermediate P-State #3	12	N/A	1800 MHz	2200 MHz
VID_VDD	4		1.250 V	1.250 V
IDD Max			45.4 A	56.9 A
Thermal Design Power	5		59.6 W	74.0 W
Intermediate P-State #4	12	N/A	N/A	2000 MHz
VID_VDD	4			1.200 V
IDD Max				50.1 A
Thermal Design Power	5			63.0 W
Intermediate P-State #5	12	N/A	N/A	1800 MHz
VID_VDD	4			1.150 V
IDD Max				44.2 A
Thermal Design Power	5			53.7 W
Intermediate P-State #6	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Min P-State		1000 MHz	1000 MHz	1000 MHz
VID_VDD	4	1.100 V	1.100 V	1.100 V
IDD Max		23.4 A	29.2 A	35.2 A
Thermal Design Power	5	28.6 W	35.0 W	41.6 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7	19.3 A	34.8 A	48.0 A
IDDC1 Max @ Min P-State	8	4.2 A	7.1 A	9.7 A
I/O Power	10	2.9 W	2.9 W	2.9 W
S3	9			
I/O Power	9, 11	500 mW	500 mW	500 mW

The notes for this table appear on page 40.

Table 16: AMD Opteron™ Processor Thermal/Power Specifications - Rev E Dual-Core

Parameter/OPN	Notes	OSA865FAA6CC	OSA870FAA6CC	OSA875FAA6CC
Tcase Max	1, 2	49°C to 67°C	49°C to 67°C	49°C to 67°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.25°C/W	0.25°C/W	0.25°C/W
Thermal Profile	6	F	F	F
Max P-State		1800 MHz	2000 MHz	2200 MHz
VID_VDD	4	1.300 V 1.350 V	1.300 V 1.350 V	1.300 V 1.350 V
IDD Max	6	70.5 A	70.5 A	70.5 A
Thermal Design Power	5, 6, 14	95.0 W	95.0 W	95.0 W
Intermediate P-State #1	12	N/A	1800 MHz	2000 MHz
VID_VDD	4		1.300 V	1.300 V
IDD Max			66.9 A	66.9 A
Thermal Design Power	5, 14		90.3 W	90.3 W
Intermediate P-State #2	12	N/A	N/A	1800 MHz
VID_VDD	4			1.250 V
IDD Max				58.1 A
Thermal Design Power	5, 14			75.9 W
Intermediate P-State #3	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Intermediate P-State #4	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Intermediate P-State #5	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #6	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Min P-State		1000 MHz	1000 MHz	1000 MHz
VID_VDD	4	1.100 V	1.100 V	1.100 V
IDD Max		33.9 A	31.8 A	29.8 A
Thermal Design Power	5, 14	40.6 W	38.3 W	36.1 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7, 15	37.7 A	37.7 A	37.7 A
IDDC1 Max @ Min P-State	8, 15	9.3 A	9.3 A	9.3 A
I/O Power	10	3.3 W	3.3 W	3.3 W
S3	9			
I/O Power	9, 11	750 mW	750 mW	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA280FAA6CB OSA880FAA6CC
Tcase Max	1, 2	49°C to 67°C
Tcontrol Max	3	70°C
Tambient	0	42°C
Thermal Resistance (case to ambient)	0	0.25°C/W
Thermal Profile		F
Max P-State	0	2400 MHz
VID_VDD	4	1.300 V 1.350 V
IDD Max	6	70.5 A
Thermal Design Power	5, 6, 14	95.0 W
Intermediate P-State #1	12	2200 MHz
VID_VDD	4	1.300 V
IDD Max	0	66.9 A
Thermal Design Power	5, 14	90.3 W
Intermediate P-State #2	12	2000 MHz
VID_VDD	4	1.250 V
IDD Max	0	58.2 A
Thermal Design Power	5, 14	76.1 W
Intermediate P-State #3	12	1800 MHz
VID_VDD	4	1.200 V
IDD Max	0	50.3 A
Thermal Design Power	5, 14	63.7 W
Intermediate P-State #4	12	N/A
VID_VDD	4	
IDD Max	0	
Thermal Design Power	5, 14	
Intermediate P-State #5	12	N/A
VID_VDD	4	
IDD Max	0	
Thermal Design Power	5	
Intermediate P-State #6	12	N/A
VID_VDD	4	
IDD Max	0	
Thermal Design Power	5, 14	
Min P-State	0	1000 MHz
VID_VDD	4	1.100 V
IDD Max	0	29.8 A
Thermal Design Power	5, 14	36.1 W
Halt/Stop Grant	0	
IDDC1 Max @ Max P-State	7, 15	37.7 A
IDDC1 Max @ Min P-State	8, 15	9.3 A
I/O Power	10	3.3 W
S3	9	
I/O Power	9, 11	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA165DAA6CD	OSA170DAA6CD	OSA175DAA6CD
Tcase Max	1, 2	49°C to 65°C	49°C to 65°C	49°C to 65°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.20°C/W	0.20°C/W	0.20°C/W
Thermal Profile	6	I	I	I
Max P-State		1800 MHz	2000 MHz	2200 MHz
VID_VDD	4	1.300 V 1.350 V	1.300 V 1.350 V	1.300 V 1.350 V
IDD Max	6	80.0 A	80.0 A	80.0 A
Thermal Design Power	5, 6, 14	110.0 W	110.0 W	110.0 W
Intermediate P-State #1	12	N/A	1800 MHz	2000 MHz
VID_VDD	4		1.300 V	1.300 V
IDD Max			79.0 A	79.0 A
Thermal Design Power	5, 14		105.6 W	105.6 W
Intermediate P-State #2	12	N/A	N/A	1800 MHz
VID_VDD	4			1.250 V
IDD Max				69.0 A
Thermal Design Power	5, 14			89.1 W
Intermediate P-State #3	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Intermediate P-State #4	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Intermediate P-State #5	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5			
Intermediate P-State #6	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 14			
Min P-State		1000 MHz	1000 MHz	1000 MHz
VID_VDD	4	1.100 V	1.100 V	1.100 V
IDD Max		44.3 A	44.3 A	41.9 A
Thermal Design Power	5, 14	51.6 W	51.6 W	49.0 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7, 15	44.5 A	44.5 A	44.5 A
IDDC1 Max @ Min P-State	8, 15	10.9 A	10.9 A	10.9 A
I/O Power	10	2.9 W	2.9 W	2.9 W
S3	9			
I/O Power	9, 11	500 mW	500 mW	500 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OS K260FAA6CB OS K860FAA6CC	OS K265FAA6CB OS K865FAA6CC	OS K270FAA6CB OS K870FAA6CC
Tcase Max	1, 2	49°C to 71°C	49°C to 71°C	49°C to 71°C
Tcontrol Max	3	70°C	70°C	70°C
Tambient		42°C	42°C	42°C
Thermal Resistance (case to ambient)		0.51°C/W	0.51°C/W	0.51°C/W
Thermal Profile	6	G	G	G
Max P-State		1600 MHz	1800 MHz	2000 MHz
VID_VDD	4	1.150 V 1.200 V	1.150 V 1.200 V	1.150 V 1.200 V
IDD Max	6	45.0 A	45.0 A	45.0 A
Thermal Design Power	5, 6, 14	55.0 W	55.0 W	55.0 W
Intermediate P-State #1	12	N/A	N/A	1800 MHz
VID_VDD	4			1.150 V
IDD Max				42.3 A
Thermal Design Power	5, 6, 14			52.0 W
Intermediate P-State #2	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 6, 14			
Intermediate P-State #3	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 6, 14			
Intermediate P-State #4	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 6, 14			
Intermediate P-State #5	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 6, 14			
Intermediate P-State #6	12	N/A	N/A	N/A
VID_VDD	4			
IDD Max				
Thermal Design Power	5, 6, 14			
Min P-State		N/A	1000 MHz	1000 MHz
VID_VDD	4		1.100 V	1.100 V
IDD Max			30.2 A	27.5 A
Thermal Design Power	5, 6, 14		36.5 W	33.5 W
Halt/Stop Grant				
IDDC1 Max @ Max P-State	7, 15	30.2 A	30.2 A	30.2 A
IDDC1 Max @ Min P-State	8, 15	N/A	7.5 A	7.5 A
I/O Power	10	3.3 W	3.3 W	3.3 W
S3	9			
I/O Power	9, 11	750 mW	750 mW	750 mW

The notes for this table appear on page 40.

Parameter/OPN	Notes	OSA180DAA6CD	
Tcase Max	1, 2	49°C to 65°C	
Tcontrol Max	3	70°C	
Tambient		42°C	
Thermal Resistance (case to ambient)		0.20°C/W	
Thermal Profile	6	I	
Max P-State		2400 MHz	
VID_VDD	4	1.300 V	1.350 V
IDD Max	6	80.0 A	
Thermal Design Power	5, 6, 14	110.0 W	
Intermediate P-State #1	12	2200 MHz	
VID_VDD	4	1.300 V	
IDD Max		79.0 A	
Thermal Design Power	5, 14	105.6 W	
Intermediate P-State #2	12	2000 MHz	
VID_VDD	4	1.250 V	
IDD Max		69.0 A	
Thermal Design Power	5, 14	89.1 W	
Intermediate P-State #3	12	1800 MHz	
VID_VDD	4	1.200 V	
IDD Max		59.9 A	
Thermal Design Power	5, 14	74.8 W	
Intermediate P-State #4	12	N/A	
VID_VDD	4		
IDD Max			
Thermal Design Power	5, 14		
Intermediate P-State #5	12	N/A	
VID_VDD	4		
IDD Max			
Thermal Design Power	5		
Intermediate P-State #6	12	N/A	
VID_VDD	4		
IDD Max			
Thermal Design Power	5, 14		
Min P-State		1000 MHz	
VID_VDD	4	1.100 V	
IDD Max		39.7 A	
Thermal Design Power	5, 14	46.6 W	
Halt/Stop Grant			
IDDC1 Max @ Max P-State	7, 15	44.5 A	
IDDC1 Max @ Min P-State	8, 15	10.9 A	
I/O Power	10	2.9 W	
S3	9		
I/O Power	9, 11	500 mW	

The notes for this table appear on page 40.

Notes:

1. Tcase max is the maximum case temperature specification which is a physical value in degrees Celsius. This value is programmed into Rev D and later processors. Refer to the AMD Functional Data Sheet, 940 Pin Package, order# 31412, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094.
2. Tcase max is programmed during device manufacturing with part-specific values for Rev E and later processors with 'Variable' indicated by the Case Temperature OPN character, and can be any valid Tcase max value in the range specified for the corresponding OPN.
3. Tcontrol max (maximum control temperature) is a non physical temperature on an arbitrary scale that can be used for system thermal management policies. Tcontrol max represents the value at which the processor has reached Tcase max when measuring the thermal diode with a dual sourcing current temperature sensor. Refer to the AMD Functional Data Sheet, 940 Pin Package, order# 31412, and the THERMTRIP Status Register in the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094. Temperature is in degrees Celsius on the Tcontrol scale.
4. The VID_VDD voltage is the VID[4:0] requested VDD supply level. Refer to the appropriate functional data sheet for details.
5. Thermal Design Power (TDP) is measured under the conditions of Tcase Max and VDD=VID_VDD, and include all power dissipated on-die from VDD, VDDIO, VLDT, VTT, and VDDA. Contact your Field Application Engineer for more information on TDP specifications.
6. Thermal Design Power (TDP) and IDD max for Rev E and later processors with 'Variable' indicated by the Operating Voltage and Case Temperature OPN characters are the limits at the highest Tcase max in the specified range for the corresponding OPN. Products will conform to the TDP and IDD Max limits at all valid voltages. The relationship of Tcase max and Thermal Profile to TDP for a specific device is defined in Table 9.
7. Assumes Tcase max, VID_VDD, clock divider set to 32.
8. Assumes 50°C, min P-state VID_VDD, clock divider set to 32.
9. Assumes 35°C, VDD, VDDA, and VLDT supplies are off, VDDIO and VTT are powered, memory in self-refresh mode and DDR SDRAM interface tri-stated except CKE pins.
10. Thermal Design Power dissipated by the processor VDDIO, VTT, VLDT, and VDDA power planes only.
11. Thermal Design Power dissipated by the processor VDDIO, VTT planes only.
12. Implementation of this P-state is optional in BIOS.
13. Limited availability.
14. Thermal Design Power (TDP) specifications for dual core processors assume equivalent P-states (Voltage and frequency) and equivalent Tcase conditions for both cores. Refer to the BIOS and Kernel Developer's Guide for AMD Athlon™ 64 and AMD Opteron™ Processors, order# 26094, for details on P-state operation for dual core processors.
15. IDDC1 specifications for dual core processors assume equivalent Voltage, clock divisor, and Tcase conditions for both cores.

2 MTOPS

Table 17 shows the Composite Theoretical Performance (CTP) calculations ("Calculations") for AMD Opteron™ microprocessors. The Calculations are stated in Millions of Theoretical Operations Per Second (MTOPS) and are based upon a formula in the United States Department of Commerce Export Administration Regulations 15 CFR 774 (Advisory Note 4 for Category 4).

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Table 17: Composite Theoretical Performance (CTP) Calculations

MTOPS	Frequency	Processor	Platform			
			1P	2P	4P	8P
Single-Core	800	2,467	2,467	4,667	9,067	17,867
	1000	3,084	3,084	5,834	11,334	22,334
	1200	3,700	3,700	7,000	13,600	26,800
	1400	4,317	4,317	8,167	15,867	31,267
	1600	4,934	4,934	9,334	18,134	35,734
	1800	5,550	5,550	10,500	20,400	40,200
	2000	6,167	6,167	11,667	22,667	44,667
	2200	6,784	6,784	12,834	24,934	49,134
	2400	7,400	7,400	14,000	27,200	53,600
	2600	8,017	8,017	15,167	29,467	58,067
	2800	8,634	8,634	16,334	31,734	62,534
	3000	9,250	9,250	17,500	34,000	67,000
Dual-Core	800	4,667	4,667	9,067	17,867	35,467
	1000	5,834	5,834	11,334	22,334	44,334
	1200	7,000	7,000	13,600	26,800	53,200
	1400	8,167	8,167	15,867	31,267	62,067
	1600	9,334	9,334	18,134	35,734	70,934
	1800	10,500	10,500	20,400	40,200	79,800
	2000	11,667	11,667	22,667	44,667	88,667
	2200	12,834	12,834	24,934	49,134	97,534
	2400	14,000	14,000	27,200	53,600	106,400
	2600	15,167	15,167	29,467	58,067	115,267
	2800	16,334	16,334	31,734	62,534	124,134
	3000	17,500	17,500	34,000	67,000	133,000